

WHAT IS CLAIMED IS:

1 1. A telecommunications system having an application layer and a transport
2 layer, the system comprising:

3 a first node which utilizes a first transport technology;

4 a second node which utilizes a second transport technology;

5 wherein the first transport technology and the second transport technology are
6 interworked for facilitating establishment of a transport bearer between the first node
7 and the second node without terminating or interworking with application control
8 signaling in the application layer.

1 2. The system of claim 1, wherein the application layer executes a radio network
2 layer procedure to initiate the transport bearer in a radio access network of a wireless
3 telecommunications system.
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1 3. The system of claim 1, further comprising a transport layer interworking
2 gateway connected between the first node and the second node.

1 4. The system of claim 3, wherein the interworking gateway receives an
2 establish request message carried by the first transport technology and converts an
3 address of the second node borne by the establish request message to an address usable
4 by the second transport technology, and wherein the interworking gateway employs the
5 address usable by the second transport technology to send a bearer signaling message to
6 the second node.

1 5. The system of claim 4, wherein the first technology is ATM and the second
2 technology is internet protocol (IP).

1 6. The system of claim 5, wherein the bearer signaling message is in an IP
2 bearer control protocol and includes a binding identifier obtained from the second node.

1 7. The system of claim 6, wherein after receipt of the bearer signaling message
2 the second node sends an IP response message to the interworking gateway, the IP
3 response message including information enabling establishment of a unidirectional
4 connection from the interworking gateway to the second node.

1 8. The system of claim 7, wherein after receipt of the IP response message, the
2 interworking gateway sends an establish confirmation message to the first node.

1 9. The system of claim 3, wherein the first node uses an address of the second
2 node to determine an address for the interworking gateway, and wherein the first node
3 sends a bearer signaling message to the interworking gateway.

1 10. The system of claim 9, wherein the bearer signaling message is in an IP
2 bearer control protocol and includes an address of the second node, a binding identifier
3 obtained from the second node, and IP connection information necessary for the
4 interworking gateway to establish a unidirectional connection to the first node.

1 11. The system of claim 10, wherein upon receiving the bearer signaling
2 message, the interworking gateway sends an establish request message towards the
3 second node, and wherein upon receipt of the establish request message the second node
4 sends an establish confirmation message toward the interworking gateway.

1 12. The system of claim 11, wherein the establish request message and the
2 establish confirmation message are q.aal2 messages.

1 13. The system of claim 11, wherein upon receipt of the establish confirmation
2 message the interworking gateway sends an IP response message to the first node, the
3 IP response message including IP connection information necessary for the first node to
4 establish a unidirectional connection to the interworking gateway.

1 14. The system of claim 1, wherein an interworking function interworks the first
2 technology and the second technology at one of the first node and the second node.

1 15. The system of claim 1, wherein an interworking function interworks the first
2 technology and the second technology at a node distinct from the first node and the
3 second node.

1 16. The system of claim 1, wherein an interworking function interworks the first
2 technology and the second technology using q.aal2 signaling.

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1 17. The system of claim 16, wherein one of the transport technologies is an
2 internet protocol (IP), and wherein the interworking function involves using internet
3 protocol (IP) specific signaling over an internet protocol (IP) network.

1 18. The system of claim 16, wherein one of the first and the second node is an
2 internet protocol (IP) node, and wherein the interworking function involves using q.aal2
3 signaling over an internet protocol (IP) network to/from the internet protocol (IP) node.

1 19. The system of claim 1, wherein the first node is an IP-connected node which
2 attempts to establish the transport bearer using application level signaling, but when
3 unsuccessful invokes an interworking function for establishing the transport bearer.

1 20. The system of claim 1, wherein the first node is an IP-connected node which
2 includes its IP address and IP endpoint identifier for uplink traffic in an IP transport
3 bearer container sent to the second node in an initiating application control message,
4 wherein if an IP transport bearer container is received from the second node in an
5 application control response message, the transport bearer is considered as being
6 established, and otherwise the interworking function is invoked by the first node.

1 21. The system of claim 1, wherein an IP-connected node obtains address
2 parameters of a transport layer interworking gateway from the transport layer
3 interworking gateway for inclusion in application layer signaling to the first node.

1 22. The system of claim 21, wherein the first node is not an IP-connected node
2 but the second node is an IP-connected node, wherein upon receipt of an initiating
3 application message from the first node, the second node obtains from the transport
4 level interworking gateway a network address of the interworking gateway and a
5 binding identifier of the interworking gateway to send back to the first node, wherein
6 the second node establishes a bidirectional IP connection with the interworking
7 gateway; and wherein the first node uses the network address of the interworking
8 gateway and the binding identifier of the interworking gateway to establish a connection
9 with the interworking gateway.

1 23. The system of claim 1, wherein a tunneling mechanism is utilized to
2 interwork the first technology and the second technology.

1 24. For use in a telecommunications system having an application layer and a
2 transport layer, the system comprising a first node which utilizes a first transport
3 technology and a second node which utilizes a second transport technology, a method
4 comprising interworking the first transport technology and the second transport
5 technology to facilitate establishment of a transport bearer between the first node and
6 the second node without terminating or interworking with application control signaling
7 in the application layer.

1 25. The method of claim 24, further comprising executing at the application
2 layer a radio network layer procedure to establish the transport bearer in a radio access
3 network (RAN) of a wireless telecommunications method.

1 26. The method of claim 24, further comprising a transport layer interworking
2 gateway connected between the first node and the second node.

1 27. The method of claim 26, further comprising:
2 receiving at the interworking gateway an establish request message carried by
3 the first transport technology;
4 converting an address of the second node borne by the establish request message
5 to an address usable by the second transport technology;
6 the interworking gateway employing the address usable by the second transport
7 technology to send a bearer signaling message to the second node.

1 28. The method of claim 27, wherein the first technology is ATM and the
2 second technology is an internet protocol (IP).

1 29. The method of claim 28, wherein the bearer signaling message is in an IP
2 bearer control protocol and includes a binding identifier obtained from the second node.

1 30. The method of claim 29, further comprising, after receipt of the bearer
2 signaling message, the second node sending an IP response message to the
3 interworking gateway, the IP response message including information enabling
4 establishment of a unidirectional connection from the interworking gateway to the
5 second node.

1 31. The method of claim 30, further comprising, after receipt of the IP response
2 message, the interworking gateway sending an establish confirmation message to the
3 first node.

1 32. The method of claim 26, further comprising:
2 the first node using an address of the second node to determine an address for the
3 interworking gateway; and
4 the first node sending a bearer signaling message to the interworking gateway.

1 33. The method of claim 32, wherein the bearer signaling message is in an IP
2 bearer control protocol, and wherein the method comprises including in the IP bearer
3 signaling message an address of the second node, a binding identifier obtained from the
4 second node, and IP connection information necessary for the interworking gateway to
5 establish a unidirectional connection to the first node.

1 34. The method of claim 33, further comprising:
2 upon receiving the bearer signaling message, the interworking gateway sending
3 an establish request message towards the second node; and
4 upon receipt of the establish request message the second node sending an
5 establish confirmation message toward the interworking gateway.

1 35. The method of claim 34, wherein the establish request message and the
2 establish confirmation message are q.aal2 messages.

1 36. The method of claim 34, further comprising upon receipt of the establish
2 confirmation message the interworking gateway sending an IP response message to the
3 first node, the IP response message including IP connection information necessary for
4 the first node to establish a unidirectional connection to the interworking gateway.

1 37. The method of claim 24, further comprising using an interworking function
2 to interwork the first technology and the second technology at one of the first node and
3 the second node.

1 38. The method of claim 24, further comprising using an interworking function
2 to interwork the first technology and the second technology at a node distinct from the
3 first node and the second node.

1 39. The method of claim 24, further comprising using q.aal2 signaling to
2 interwork the first technology and the second technology.

1 40. The method of claim 39, wherein one of the transport technologies is an
2 internet protocol (IP), and further comprising performing interworking using internet
3 protocol (IP) specific signaling over an internet protocol (IP) network.

1 41. The method of claim 39, wherein one of the first and the second node is an
2 internet protocol (IP) node, and further comprising performing interworking using
3 q.aal2 signaling over an internet protocol (IP) network to/from the internet protocol (IP)
4 node.

1 42. The method of claim 24, wherein the first node is an IP-connected node, and
2 further comprising: the first node attempting to establish the transport bearer using
3 application level signaling, but when unsuccessful the first node invoking an
4 interworking function for establishing the transport bearer.

1 43. The method of claim 24, wherein the first node is an IP-connected node, and
2 wherein the method further comprises:

3 the first node including its IP address and IP endpoint identifier for uplink traffic
4 in an IP transport bearer container sent to the second node in an initiating application
5 control message;

6 wherein if an IP transport bearer container is received from the second node in an
7 application control response message, considering the transport bearer to be established,
8 and otherwise invoking interworking by the first node.

1 44. The method of claim 24, wherein the second node is an IP-connected node,
2 the method further comprising: obtaining address parameters of a transport layer
3 interworking gateway from the transport layer interworking gateway for inclusion in
4 application layer signaling to the first node.

1 45. The method of claim 44, wherein the first node is not an IP-connected node
2 but the second node is an IP-connected node, the method further comprising:

3 upon receipt of an initiating application message from the first node, the second
4 node obtaining from the transport level interworking gateway a network address of the
5 interworking gateway and a binding identifier of the interworking gateway to send back
6 to the first node;

7 the second node establishing a bidirectional IP connection with the interworking
8 gateway; and

9 the first node using the network address of the interworking gateway and the
10 binding identifier of the interworking gateway to establish a connection with the
11 interworking gateway.

1 46. The method of claim 24, further comprising using a tunneling mechanism to
2 interwork the first technology and the second technology.

1 47. A telecommunications system having an application layer and a transport
2 layer, the application layer being a radio network layer, the system comprising:

3 a first node which is connected to use Internet Protocol;

4 a second node;

5 wherein the first node attempts to establish a transport bearer between the first
6 node and the second node using application level signaling, but when unsuccessful
7 invokes an interworking function in the transport layer for establishing the transport
8 bearer.

1 48. The system of claim 47, wherein the first node includes its IP address and IP
2 endpoint identifier for uplink traffic in an IP transport bearer container sent to the
3 second node in an initiating application control message, and wherein if an IP transport
4 bearer container is received from the second node in an application control response
5 message, the transport bearer is considered as being established, and otherwise the
6 interworking function is invoked by the first node.

1 49. The system of claim 47, further comprising a transport layer interworking
2 gateway connected between the first node and the second node.

1 50. The system of claim 49, wherein the interworking gateway receives an
2 establish request message carried by the first transport technology and converts an
3 address of the second node borne by the establish request message to an address usable
4 by the second transport technology, and wherein the interworking gateway employs the
5 address usable by the second transport technology to send a bearer signaling message to
6 the second node.

1 51. The system of claim 50, wherein the first technology is ATM and the second
2 technology is an internet protocol (IP).

1 52. The system of claim 51, wherein the bearer signaling message is in an IP
2 bearer control protocol and includes a binding identifier obtained from the second node.

1 53. The system of claim 52, wherein after receipt of the bearer signaling
2 message the second node sends an IP response message to the interworking gateway,
3 the IP response message including information enabling establishment of a
4 unidirectional connection from the interworking gateway to the second node.

1 54. The system of claim 53, wherein after receipt of the IP response message,
2 the interworking gateway sends an establish confirmation message to the first node.

1 55. The system of claim 47, wherein the first node uses an address of the second
2 node to determine an address for the interworking gateway, and wherein the first node
3 sends a bearer signaling message to the interworking gateway.

1 56. For use in a telecommunications system having an application layer and a
2 transport layer, the application layer being a radio network layer, the system comprising
3 a first node which is connected to use Internet Protocol and a second node, a method
4 comprising attempting to establish a transport bearer between the first node and the
5 second node using application level signaling, but when unsuccessful invoking an
6 interworking function in the transport layer for establishing the transport bearer.

1 57. The method of claim 56, further comprising:

2 the first node including its IP address and IP endpoint identifier for uplink traffic
3 in an IP transport bearer container sent to the second node in an initiating application
4 control message;

5 upon receiving an IP transport bearer container from the second node in an
6 application control response message, considering the transport bearer as being
7 established, but

8 otherwise invoking the interworking function.

1 58. The method of claim 56, further invoking the interworking function involves
2 accessing a transport layer interworking gateway connected between the first node and
3 the second node.

1 59. The method of claim 58, further comprising:
2 upon receiving at the interworking gateway an establish request message carried
3 by the first transport technology, converting an address of the second node borne by the
4 establish request message to an address usable by the second transport technology; and
5 employing the address usable by the second transport technology to send a bearer
6 signaling message to the second node.

1 60. The method of claim 59, wherein the first technology is ATM and the
2 second technology is an internet protocol (IP).

1 61. The method of claim 60, further comprising forming the bearer signaling
2 message in an IP bearer control protocol and including in the bearing signaling message
3 a binding identifier obtained from the second node.

1 62. The method of claim 61, further comprising after receipt of the bearer
2 signaling message, the second node sending an IP response message to the interworking
3 gateway, the IP response message including information enabling establishment of a
4 unidirectional connection from the interworking gateway to the second node.

1 63. The method of claim 62, further comprising, after receipt of the IP response
2 message, the interworking gateway sending an establish confirmation message to the
3 first node.

1 64. The method of claim 63, further comprising:
2 the first node using an address of the second node to determine an address for the
3 interworking gateway; and
4 the first node sending a bearer signaling message to the interworking gateway.

1 65. A telecommunications system having an application layer and a transport
2 layer, the application layer being a radio network layer, the system comprising:
3 a first node;
4 a second node which is connected to use Internet Protocol;
5 a transport layer interworking gateway;
6 wherein the second node obtains address parameters of the transport layer
7 interworking gateway from the transport layer interworking gateway for inclusion in
8 application layer signaling to the first node in order to enable the first node to use the
9 transport layer interworking gateway for the purpose of establishing a transport bearer
10 between the first node and the second node.

1 66. The system of claim 65, wherein the first node is not an IP-connected node
2 but the second node is an IP-connected node, wherein upon receipt of an initiating
3 application message from the first node, the second node obtains from the transport
4 level interworking gateway a network address of the interworking gateway and a
5 binding identifier of the interworking gateway to send back to the first node, wherein
6 the second node establishes a bidirectional IP connection with the interworking
7 gateway; and wherein the first node uses the network address of the interworking
8 gateway and the binding identifier of the interworking gateway to establish a connection
9 with the interworking gateway.

1 67. For use in a telecommunications system having an application layer and a
2 transport layer, the application layer being a radio network layer; the system comprising
3 a first node, a second node which is connected to use Internet Protocol; and a transport
4 layer interworking gateway; a method comprising:
5 the second node obtaining address parameters of the transport layer interworking
6 gateway for inclusion in application layer signaling to the first node, thereby enabling
7 the first node using the transport layer interworking gateway for the purpose of
8 establishing a transport bearer between the first node and the second node.

1 68. The method of claim 67, wherein the first node is not an IP-connected node
2 but the second node is an IP-connected node, further comprising:

3 upon receipt of an initiating application message from the first node, the second
4 node obtaining from the transport level interworking gateway a network address of the
5 interworking gateway and a binding identifier of the interworking gateway for the
6 second node to send back to the first node;

7 the second node establishing a bidirectional IP connection with the interworking
8 gateway;

9 the first node using the network address of the interworking gateway and the
10 binding identifier of the interworking gateway to establish a connection with the
11 interworking gateway.

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